CLAIMS

1. An X-ray CT scanner including an X-ray source that irradiates X-rays to an object, an X-ray detector composed of a plurality of X-ray detecting elements which convert X-rays penetrating the object into electric signals at every timing of projection, a data correction means for correcting an output of the X-ray detector, and an arithmetic processing means for performing arithmetic processing on an output of the data correction means so as to reconstruct an image, comprising:

a first memory means in which data of the response characteristic of the X-ray detector that is the afterglow-related characteristic thereof and that is measured in advance is stored; and

a second memory means in which output data items produced by the X-ray detector over past projections and corrected by the data correction means on the basis of the response characteristic data are stored, wherein:

the data correction means includes an afterglow correction means that uses the response characteristic data stored in the first memory means and the plurality of output data items, which are produced over a plurality of past projections and stored in the second memory means, to compensate both an adverse effect of inflow of signals from the past projections due to afterglow on output data producing current

projection, and an adverse effect of outflow of signals to future projections.

2. An X-ray CT scanner including an X-ray source that irradiates X-rays to an object, an X-ray detector composed of a plurality of X-ray detecting elements which convert X-rays penetrating the object into electric signals, a data correction means for correcting an output of the X-ray detector, and an arithmetic processing means for performing arithmetic processing on an output of the data correction means so as to reconstruct an image, comprising:

a first memory means in which data of the response characteristic of the X-ray detector that is the afterglow-related characteristic thereof and that is measured in advance is stored; and

a second memory means in which output data items produced by the X-ray detector over past projections and corrected by the data correction means on the basis of the response characteristic data are stored, wherein:

the data correction means includes an afterglow correction means that uses the response characteristic data stored in the first memory means and the output data items, which are produced over the past projections and stored in the second memory means, to compensate both an adverse effect of inflow of signals from the past projections due to afterglow

on output data produced during current projection, and an adverse effect of outflow of signals to future projections according to a predetermined expression;

assuming that Lag(j) denotes the ratio of afterglow components that have occurred over j projections since the irradiated X-rays fall on the X-ray detector, m denotes the number of past projections over which afterglow components to be compensated have occurred since the X-rays fall on the X-ray detector, n denotes the number of future projections for which an afterglow component having occurred since the X-rays fall on the X-ray detector should be compensated, I(N) denotes output data produced after N projections have been completed since the X-rays fall on the X-ray detector, and I′(N) denotes output data produced when the data correction means corrects the output data I(N), which is produced after the completion of N projections, so as to compensate the afterglow, the predetermined expression is provided as follows:

$$I'(N)=\frac{I(N)-\sum_{j=1}^{m}\left(Lag(j)\cdot I'(N-j)\right)}{1-\sum_{j=1}^{n}\left(Lag(j)\right)}$$

3. The X-ray CT scanner according to Claim 2, wherein:

the response characteristic of the X-ray detector is indicated by the sum of afterglow components exhibiting

different time constants and intensities;

the number of past projections, m, over which afterglow components to be compensated have occurred and/or the number of future projections, n, for which an afterglow component having occurred since the X-rays fall on the X-ray detector should be compensated vary depending on the afterglow component.

4. An X-ray CT scanner including an X-ray source that irradiates X-rays to an object, an X-ray detector composed of a plurality of X-ray detecting elements which convert X-rays penetrating the object into electric signals, a data correction means for correcting an output of the X-ray detector, and an arithmetic processing means for performing arithmetic processing on an output of the data correction means so as to reconstruct an image, comprising:

a first memory means in which a time constant and an intensity of afterglow including a plurality of predetermined components are stored; and

a second memory means in which output data items produced by the X-ray detector over past projections and corrected by the data correction means on the basis of the time constants and intensities of the afterglow components are stored, wherein:

the data correction means includes an afterglow correction means that uses the time constants and intensities of the respective afterglow components stored in the first memory

means and the output data items, which are produced over the past projections and stored in the second memory means, to compensate, according to a predetermined expression, both an adverse effect of inflow of signals from the past projections due to the afterglow on output data produced during current projection, and an adverse effect of outflow of signals to future projections; and

assuming that ΔT denotes a time interval between projections, M denotes the number of afterglow components, τ_i denotes a time constant of an afterglow component i (where i denotes 1, 2, etc., or M), A_i denotes an intensity of the afterglow component i , m_i denotes the number of past projections over which the afterglow components i to be compensated have occurred since the X-rays fall on the X-ray detector, n_i denotes the number of future projections for which an afterglow component i having occurred since the X-rays fall on the X-ray detector should be compensated, I(N) denotes output data produced when N projections have been completed since the X-rays fall on the X-ray detector, and I'(N) denotes output data produced when the data correction means corrects the output data I(N), which is produced after the completion of N projections, so as to compensate the afterglow, the predetermined expression is provided as follows:

$$I'(N)=\frac{I(N)-\sum_{i=1}^{M}\left(\sum_{j=1}^{ni}\left(A_i\exp\left(-\frac{j\Delta T}{\tau_i}\right)\cdot I'(N-j)\right)\right)}{1-\sum_{i=1}^{M}\left(\sum_{j=1}^{ni}\left(A_i\exp\left(-\frac{j\Delta T}{\tau_i}\right)\right)\right)}$$

5. The X-ray CT scanner according to Claim 1, wherein the X-ray CT scanner supports an afterglow measurement mode in which X-rays are impulsively irradiated only during projection or stepwise irradiated only during a plurality of projections in order to acquire in advance data of the response characteristic of the X-ray detector that is the afterglow-related characteristic thereof, and includes a facility for selecting the afterglow measurement mode.

6. The X-ray CT scanner according to Claim 2, wherein the X-ray CT scanner supports an afterglow measurement mode in which X-rays are impulsively irradiated only during projection or stepwise irradiated only during a plurality of projections in order to acquire in advance data of the response characteristic of the X-ray detector that is the afterglow-related characteristic thereof, and includes a facility for selecting the afterglow measurement mode.

7. The X-ray CT scanner according to Claim 4, wherein the

X-ray CT scanner supports an afterglow measurement mode in which X-rays are impulsively irradiated only during projection or stepwise irradiated only during a plurality of projections in order to acquire in advance data of the response characteristic of the X-ray detector that is the afterglow-related characteristic thereof, and includes a facility for selecting the afterglow measurement mode.